MAGNETIC SEPARATOR POWER SURVEY

TO: PHIL TICE
DATE: 7/7/87

FROM: JIM NELSON

A systematic survey has been completed of all voltage and amperage values on the seven magnetic seperators located in coal handling. This was accomplished with all primary belts loaded and running. The results appear as follows:

MAG.SEP. #	VDC	ADC(measured)	ADC(rated)	VAC
15A				
At rectifier(rect.)	111.2	54.3	56.5	470
At the magnet(magnt)	103.5			
15B				
rect.	114.7	46.4	56.5	480
magnt	107.4			
3O				
rect.	116.9	28.5	43.5	489
magnt	107.8			
4				
rect.	113.7	58	56.5	480
magnt	108.0			
8				
rect.	118.7	68	78.3	495
magnt	112.2			
2A				
rect.	114.0	85	78.3	478
magnt	106.5			
2B				
rect.	116.0	71	78.3	487
magnt	107.0			

The magnetic separators are designed for 115vdc at the magnet. Voltage inconsistencies at the transformer primary should also be noted.

In addition to the apparent magnet power problem, operators have also been experiencing frequent trips, both instantaneous and time-current. We are currently attempting to establish some sort of operational or system failure pattern in order to identify the root causes.

As a minimum, it appears from these data that all existing separators

are well below the design voltage at the magnet. Conveyor 8, at first glance appears to be the possible exception. However, if bus voltage is ever reduced, closer to design point, magnet voltage on conveyor 8 would also likely become unacceptable.

If, as has been suggested, we were to change out the existing awg#6 conductors from the recitifier to the magnet, the following increases in voltage could be realized at the magnets:

Wire Gauge #	Average Increase in Voltage at the Magnet
#4	3-4 volts
#2	5-6.5volts
#1/0	8-9volts

Installation budget estimates, including cable, conduit and labor(at $25/hr) for replacement of all magnetic separator dc power cable, are as follows:

#4 awg	$13,500
#2 awg	$15,000
#1/0 awg	$17,500

Please review and comment by July 13.

CECIL,

HERE ARE THE READINGS I TOOK THURS AFTERNOON 12/21/89

STATISTICS ON CONVEYOR #15B & MAGNETIC SEPERATOR.

1. CONVEYOR 15B BELT SPEED = 600 F.P.M.
2. MAGNETIC SEPERATOR BELT SPEED = 600 F.P.M.
3. MAGNETIC SEPERATOR MOTOR SPEED = 1772 R.P.M.
4. MAGNETIC SEPERATOR REDUCER INPUT SHAFT SPEED = 812 R.P.M.

FORM 13
McNally Systems, Inc.

PROPOSAL OR S O. No

FOR

DATE

AT

BY CKD

DESCRIPTION

DWG

IP12_004712

FILE NO.-1200

MEMO

TO: PHIL TICE FROM: JIM NELSON DATE: 10/28/87
SUBJECT: MAGNETIC SEPARATOR FIELD TESTING

A field test of the magnetic separators has recently been concluded. Previous electrical performance testing as well as this most recent round of operational testing has verified, conclusively, that the magnetic separators do not even come close to design performance. THE MAGNETIC SEPARATORS SHOULD BE ABLE TO REMOVE PIECES OF STEEL WEIGHING UP TO 100lbs. , BURIED UNDER THE COAL ON THE BELT.

Reliability is also a major issue with the magnetic separators. Magnetic separators are constantly going out on electrical and mechanical problems. In fact, after several days of repair efforts on separator 2A, we were still unable to run it, and as a result, the operational test results presented here do not include separator 2A.

The following test results were obtained by preparing several test sections of square tubular steel. Test sections were prepared in five (5) pound increments from five (5) to thirty (30) pounds. Each section of tubular steel would first be run through on the empty belt beginning with the five (5) pound section. If successful, the belt would be loaded with coal and the same sequence would be followed. The following table shows the test section weight which the separator did not pick off the EMPTY belt and allowed to pass.

Separator	Weight of Test Section Allowed to Pass on Empty Belt
2B	10 LBS.
4	10 LBS.
8	5 LBS.
15A	10 LBS.
15B	10 LBS.
30	5 LBS.

There is no reason to believe that the magnetic separators have ever operated properly, despite several rounds of factory directed adjustments. Certainly a great deal of damage has been done to the plant coal handling equipment as a result.

With all separator housings resting directly on the coal chutes it is quite apparent that the separators have been given every opportunity to operate properly if they had been designed properly.

FOR THE PRESENT, WE ESSENTLIALLY HAVE NO SEPARATOR PROTECTION.

JIM KELSEY 7/26/88

- SHAFT + KEYS FOR MAGNETIC SEPARATOR MODS.

SHAFTS

#	SHAFT LAYOUTS	SHAFT SIZE
3 EA.	7'-7", 5'-1", 6'-3"	1 5/16
4 EA.	7'-7", 5'-1", 6'-1"	"
1 EA.	7'-7", 5'-3", 6'-1"	"
4 EA.	7'-7", 6'-1", 6'-1"	"
2 EA.	6'-1", 6'-1", 6'-1"	"
1 EA.	6'-1", 6'-1"	"
4 EA.	7'-3", 7'-3"	2 7/16
1 EA.	7'-3", 7'-7"	"
1 EA.	7'-7", 7'-7"	"

- KEYS MUST BE MACHINED IN 7 OF THE ABOVE SHAFTS SEE MYSELF OR [redacted] BOB ARCHIBALD FOR DETAILS. KEY SIZES VARY. — JIM N. EXT. 6464

FILE NO.-1200

MEMO

TO: PHIL TICE FROM: JIM NELSON DATE: 10/28/87
SUBJECT: MAGNETIC SEPARATOR FIELD TESTING

A field test of the magnetic separators has recently been concluded. Previous electrical performance testing as well as this most recent round of operational testing has verified, conclusively, that the magnetic separators do not even come close to design performance. THE MAGNETIC SEPARATORS SHOULD BE ABLE TO REMOVE PIECES OF STEEL WEIGHING UP TO 100lbs. , BURIED UNDER THE COAL ON THE BELT.

Reliability is also a major issue with the magnetic separators. Magnetic separators are constantly going out on electrical and mechanical problems. In fact, after several days of repair efforts on separator 2A, we were still unable to run it, and as a result, the operational test results presented here do not include separator 2A.

The following test results were obtained by preparing several test sections of square tubular steel. Test sections were prepared in five (5) pound increments from five (5) to thirty (30) pounds. Each section of tubular steel would first be run through on the empty belt beginning with the five (5) pound section. If successful, the belt would be loaded with coal and the same sequence would be followed. The following table shows the test section weight which the separator did not pick off the EMPTY belt and allowed to pass.

Separator	Weight of Test Section Allowed to Pass on Empty Belt
2B	10 LBS.
4	10 LBS.
8	5 LBS.
15	10 LBS.
15'	10 LBS.
30	5 LBS.

There is no reason to believe that the magnetic separators have ever operated properly, despite several rounds of factory directed adjustments. Certainly a great deal of damage has been done to the plant coal handling equipment as a result.

With all separator housings resting directly on the coal chutes it is quite apparent that the separators have been given every opportunity to operate properly if they had been designed properly.

FOR THE PRESENT, WE ESSENTIALLY HAVE NO SEPARATOR PROTECTION.

JHR

INTERMOUNTAIN POWER SERVICE CORPORATION

File: 01.03.02
43.1200

August 10, 1989

Mr. Gary Rose
Site Construction Manager
Route 1, Box 824
Delta, UT 84624

Dear Mr. Rose:

CMP #9C0603 - Magnetic Separator Warranty Modifications

Another round of testing is now complete on the modified magnetic separator, 15B. The tests revealed that the separators are still seriously inadequate.

During the week of July 31, 1989, IPSC arranged and performed a series of three tests. The tests were performed using the following pieces of magnetically responsive carbon steel:

1) 1-1/2 inch square x 6 inches long, approximately 3.0 pounds
2) 1/4 inch plate, 8 inches x 8 inches square, approximately 4.5 pounds
3) 3/8 inch plate, 8 inches x 8 inches square, approximately 6.7 pounds
4) 4 inch channel, 16 inches long approximately 11.0 pounds
5) 1 inch plate, 8 inches x 8 inches square, approximately 19.5 pounds
6) 12 inch diameter, flat ring approximately 30.0 pounds

Only one-third of the pieces were removed from the clean belt and deposited in the tramp metal chute as designed. The three tests yielded the following results:

Test #	Piece(s) Removed from the Belt
1	3, 5 and 6
2	3
3	3 and 6

A representative from Black & Veatch was on-site to observe the test and agreed with the conclusions stated previously.

Brush Wellman Road, Delta, Utah / Mailing Address: Rt. 1, Box 864, Delta, Utah 84624 / Telephone: (801) 864-4414 / FAX: (801) 864-4970

Please address any questions regarding this test, to Mr. Jim Nelson at (801) 864-4414, extension 6464.

Sincerely,

S.G.C./R.A.D.

S. Gale Chapman
President & Chief Operations Officer

GKM
JHN:vc

MAGNETIC SEPARATOR RUNNING AMPS

To: Phil Tice From: Jim Nelson Date:7/17/

Another series of tests were recently completed on the magnetic separators for the purpose of determining actual running amps and th implications as to available magnet strength.

The following amperage readings were taken at the magnet transformer and provide the respective comparisons with magnet design power:

	Magnetic Separator #						
	2A	2B	4	8	15A	15B	30
Starting Amps Design	11.99	11.99	8.23	11.99	8.23	8.23	6.1
Running Amps Design	8.39	8.39	5.76	8.39	5.76	5.76	4.3
Running Amps Actual	8.90	9.40	6.40	7.60	5.20	5.40	4.2
Actual % of Starting	74	78	78	65	63	66	68
Actual % of Running	100+	100+	100+	90.6	90.3	93.8	96.

The original design specifies running current (after approx. 1-2 hrs run time) as minimum 70% of design starting current. All above readings are in AC amps.

From the above data it is apparent that although we are not meeting design in several cases, we are within 10% of design magnet strength in all cases. This means that we should be able to remove all metal from the conveyors which are 90 lbs or less.

Obviously, there are factors other than magnet amperage which affect the ability to remove metal from the conveyors. Configuration of magnet with respect to the conveyor and chutes is also a concern.

The next step, at this point, will be to prepare several pre-weighed chunks of scrap metal (ranging from 5 to 50 lbs.) and proceed with a functional test of the separators. We will begin with the smallest chunk on a bare conveyor. If successful, we will bury the same small chunk on the conveyor and try again. We will continue in the same manner through all weight catagories until we are unsuccessful in

extracting the metal from the belt.

Any comments on the results or procedures presented here are welcome

MAGNETIC SEPARATOR POWER SURVEY

TO : PHIL TICE
TI: 7/7/87

FROM: JIM NELSON

A systematic survey has been completed of all voltage and amperage values on the seven magnetic seperators located in coal handling. This was accomplished with all primary belts loaded and running. The results appear as follows:

M.S.Sep. #	VLC	ADC(measured)	ADC(rated)	VAC
15A				
At rectifier(rect.)	111.2	54.3	56.5	470
At the magnet(magnt)	103.5			
15B				
rect.	114.7	46.4	56.5	480
magnt	107.4			
2B				
rect.	116.9	28.5	43.5	480
magnt	107.8			
rect.	113.7	56	56.5	480
magnt	108.0			
8				
rect.	118.7	68	78.3	495
magnt	112.2			
2A				
rect.	114.0	65	78.3	478
magnt	106.5			
2B				
rect.	114.0	71	78.3	487
magnt	107.0			

The magnetic separators are designed for 115vdc at the magnet. Voltage inconsistencies at the transformer primary should also be noted.

In addition to the apparent magnet power problem, operators have also been experiencing frequent trips, both instantaneous and time-current. We are currently attempting to establish some sort of operational or system failure pattern in order to identify the root causes.

As a minimum, it appears from these data that all existing separators

are well below the design voltage at the magnet. Conveyor 3, at first glance appears to be the possible exception. However, if bus voltage is ever reduced, closer to design point, magnet voltage on conveyor 3 could also likely become unacceptable.

If, as has been suggested, we were to change out the existing awg#6 conductors from the rectifier to the magnet, the following increases in voltage could be realized at the magnets:

Wire Gauge	Average Increase in Voltage at the Magnet
#4	3-4 volts
#2	5-6.5volts
#1/0	8-9volts

Installation budget estimates, including cable, conduit and labor(at $/hr) for replacement of all magnetic separator dc power cable, are as follows:

#4 awg	$13,500
#2 awg	$15,000
#1/0	$17,500

Please review and comment by July 13.

MEMORANDUM

Intermountain Power Services Corporation

TO:Dave Hawk

FROM:Jim Nelson

DATE:11/13/87

SUBJECT: Mag. Separators-Addition to Preventative Mntnce. Text

As part of our ongoing efforts to improve the performance of the magnetic separators, I would like to suggest that we add testing and calibration of the DC undercurrent relays on the magnets. These relays have surfaced as a primary cause of repetitive trips on the magnetic separators.

Just let me know if you have any problems with this addition.

INTERMOUNTAIN POWER SERVICE CORPORATION

File: 01.03.02
43.1200

October 30, 1987

Mr. Gary Rose
Intermountain Power Project
P.O. Box 824 Rt. 1
Delta, UT 84624

Dear Mr. Rose:

Magnetic Separators - Intermountain Power Coal Handling

The attached memo to Phil Tice outlines the results of extended testing of the magnetic separators completed by IPSC. We recommend that formal notification be given to McNally and that an appropriate corrective plan be provided by them.

Efforts to rectify the magnetic separators should be scheduled through the appropriate operations department. Jim Nelson, with IPSC Engineering, will provide background and liason support as required.

Sincerely,

Dennis K. Killian
Superintendent of Technical Services

JN:vc

attachment

Brush Wellman Road, Delta, Utah / Mailing Address: Rt. 1, Box 864, Delta, Utah 84624 / Telephone: (801) 864-4414

INTERMOUNTAIN POWER SERVICE CORPORATION
INTERMOUNTAIN GENERATING STATION
MEMORANDUM

BY: Jim Nelson **TO:** Phil Tice
DATE: 10-30-87 **FILE:** 01.12.09 43.1200
SUBJECT: Magnetic Separator Field Testing

A field test of the magnetic separators has recently been concluded. Previous electrical performance testing as well as this most recent round of operational testing has verified, conclusively, that the magnetic separators do not even come close to design performance. THE MAGNETIC SEPARATORS SHOULD BE ABLE TO REMOVE PIECES OF STEEL WEIGHING UP TO 100 lbs., BURIED UNDER THE COAL ON THE BELT.

Reliability is also a major issue with the magnetic separators. Magnetic separators are constantly going out on electrical and mechanical problems. In fact, after several days of repair efforts on separator 2A, we were still unable to run it, and as a result, the operational test results presented here do not include separator 2A.

The following test results were obtained by preparing several test sections of square tubular steel. Test sections were prepared in five (5) pound increments from five (5) to thirty (30) pounds. Each section of tubular steel would first be run through on the empty belt beginning with the five (5) pound section. If successful, the belt would be loaded with coal and the same sequence would be followed. The following table shows the test section weight which the separator did not pick off the EMPTY belt and allowed to pass.

Separator	Weight of Test Section Allowed to Pass on Empty Belt
2B	10 lbs.
4	10 lbs.
8	5 lbs.
15A	10 lbs.
15B	10 lbs.
30	5 lbs.

There is no reason to believe that the magnetic separators have ever operated properly, despite several rounds of factory directed adjustments. Certainly a great deal of damage has been done to the plant coal handling equipment as a result.

With all separator housings resting directly on the coal chutes, it is quite apparent that the separators have been given every opportunity to operate properly if they had been designed properly.

FOR THE PRESENT, WE ESSENTIALLY HAVE NO SEPARATOR PROTECTION.

JN:vc

JHN

INTERMOUNTAIN POWER SERVICE CORPORATION

File: 01.03.02
43.1200

October 11, 1988

Mr. Gary Rose
Intermountain Power Project
Rt. 1, Box 824
Delta, Utah 84624

Dear Mr. Rose:

Magnetic Separator 15A Testing

During the week of September 19, 1988, IPSC maintenance crews completed all warranty work on Magnetic Separator 15A. Results from initial testing on Separator 15A provide no basis for concluding that separator performance has improved.

Two (2) rounds of testing have now been conducted since the completion of modifications on Separator 15A. The first test was initiated and conducted by IPSC. The second test was requested by McNally-Pittsburg and Ding, Inc., and conducted by IPSC. Both tests provided results which reflect poorly on the performance capability of the magnetic separators.

The first test was arranged using seven (7) pieces of 8" X 10" carbon steel of varying thicknesses and four (4) pieces of carbon steel of assorted size and weight. These pieces were laid at the bottom of a normal bed (approximately six [6] inches) of coal and run by the separator.

In this first test, only the 8" X 10" pieces below 21 lb. were removed from the flow. Pieces heavier than 21 lb. (8" X 10") and all pieces of odd shape were not removed from the coal flow.

The second test, conducted at the request and direction of McNally-Pittsburgh, Inc., was run with no coal on the belt. Fourteen (14) pieces of steel were placed on the clean belt. The separator failed to pick up six (6) of the pieces and barely managed to pull two (2) of the larger pieces into the tramp metal chute.

The pieces which were not removed were of the following dimensions:

C.S. Plate: 8" X 10" X 1"
C.S. Bar : 4" X 20" X 3/4"
C.S. Angle: 2" X 2" X 1/4" X 18"
C.S. Beam : W4 X 13 lb. X 20"

Brush Wellman Road, Delta, Utah / Mailing Address: Rt. 1, Box 864, Delta, Utah 84624 / Telephone: (801) 864-4414

C.S. Bracket: 4" X 4" X 2"
C.S. Bracket: 4" diam. X 2" X 1/4"

The two (2) pieces which barely managed to pass over the divertor plate were:

C.S. Plate: 8" X 10" X 1-1/2"
Idler Bracket: 12" X 9" X 1/4"

All pieces were repeatedly checked to verify their affinity to a magnetic field.

The divertor plate and magnet area was carefully observed throughout the duration of the second test. It was obvious that the magnet had considerably more difficulty pulling the heavier pieces off the belt. Several times, the pieces either bounced off the separator belt or were held by only one edge. Those held by only one edge were normally knocked off into the coal flow by the divertor plate.

Both McNally-Pittsburg and Ding, Inc., have talked at length with IPSC Engineering about why the separators should be working. We feel it is now time for the manufacturer to deal with the problem in person.

Thank you for your assistance in this matter.

Sincerely,

S. Gale Chapman
President & Chief Operations Officer

JN:pb

INTERMOUNTAIN POWER PROJECT
A DEVELOPMENT OF INTERMOUNTAIN POWER AGENCY

Construction Site
Rt. 1, Box 824
Delta, Utah 84624
(801) 864-4511

RECEIVED
NOV 12 1987
"TECHNICAL SERVICES"

DKK
BP
JMK
PBT
JLY
FILE

cc "P. Tice" 11-17-87 "J. Nelson"

November 10, 1987

Mr. Gary Skidmore
Project Engineer
McNally Pittsburg Mfg. Corp.
P. O. Drawer D
Pittsburgh, Kansas 66762

SCM #367

Dear Gary:

The attached memo from Jim Nelson to Phil Tice, dated 10/30/87, describes the results of a series of magnetic separator performance tests. These results indicate that the magnetic separators are definitely not in compliance with section 2J.2 of the 61.0403 contract.

Please proceed, at your expense, to resolve this deficiency. This work should be done as soon as possible in order to minimize any further damage to downstream equipment. Mr. Jim Nelson, of IPSC, is available to assist you with any operations or maintenance support that may be required. He can be reached at (801) 864-4414, extension 6464.

In addition, please purchase one new section of chain conveyor casing, with expansion joint, for installation near the drive end of conveyor 102B. Also, please make arrangements for a Stephens-Adamson field representative to supervise the installation of this new section and to observe the re-alignment of the conveyor drive unit.

The cost of this new casing section and of the field representative should be billed to the project.

If you have any questions concerning these items, please contact Mr. Shane Holst at (801) 864-4511, extension 338.

Sincerely,

Gary T. Rose
Site Construction Manager

Attachment

cc: T. H. McGuinness
D. W. Fowler
S. G. Chapman
D. K. Killian
R. McCartney